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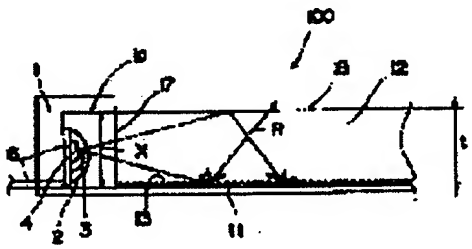
(54) BACK LIGHT

(57)Abstract:
PURPOSE: To thin a back light and prevent light leakage by making the opening width of a reflecting cover almost the same with the thickness of a light diffusing plate end face, in a structure wherein light is made incident from the side face of the diffusing plate having a reflecting face on its bottom and radiated out of the face opposite to the reflecting face.



CONSTITUTION: LED light R emitted out of a LED element 4 goes straight or is reflected on a reflecting sheet 11 or a reflecting end face 1a to be incident upon a diffusing plate 12. The light R is repeatedly reflected between the inner face of a radiating face 18 and a diffusing face 13, which is the bottom of the diffusing plate and the light reaches the radiating face 18 at critical angle or more is radiated to the outside. In this case, a gradation pattern is formed in the diffusing face 13 due to a large number of projected parts formed more densely as the distance from the element 4 is larger and the light is diffused and reflected efficiently and at the same time the brightness of the light R is made uniform. With this structure, since the width X of the opening part of a reflecting cover 1 in the light emitting part and the thickness (t) of the diffusing plate 12 are set almost equal to each other, the gap between them is eliminated to thin the structure and the light R is prevented from leaking outside.

LEGAL STATUS

[Date of request for examination]

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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] It is the back light which a base is made to carry out ON light of the light of the light source from the side-face edge of the optical diffusion plate member which comes to have a reflector, and acts as Idemitsu from the reflector of said optical diffusion plate member, and the field of the opposite side. The back light characterized by making the board thickness of said optical diffusion plate member carry out abbreviation coincidence of the distance between the reflectors arranged in the vertical side of the space section formed between reflective covering holding said light source, and said side-face edge.
[Claim 2] Said reflective covering is a back light according to claim 1 characterized by making at least one side fit into the crevice which was equipped with the wrap flange section and formed in the side-face edge of said optical diffusion plate member among the vertical sides of the luminescence reflective section which makes the light from said light source reflect in said optical diffusion plate member side while being formed in said board thickness and abbreviation same thickness, and said space section.

[Translation done.]

JAPANESE [JP,07-235207,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS OPERATION EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the back light of the liquid crystal display section which has for example, the LED light source.
[0002]
[Description of the Prior Art] Many back lights conventionally used for irradiating the liquid crystal display section are proposed. For example, as shown in drawing 10 , back light 100' is equipped with the LED component 4, reflective covering 1', and the diffusion plate 12. The LED component 4 is fixed to a part of reflective covering 1' which reflects the LED light R while it fixes the LED component 4 on a substrate 5. Reflective covering 1' is fixed on a substrate 5. Moreover, the LED component 4 is electrically connected to the leadframe 6 through lead wire 3. As for the LED light source 4, the LED array of COB, an LED lamp, an LED chip lamp, etc. are used. Outgoing radiation of the LED light R emitted from the light source is carried out outside, reflecting between the reflective sheet 11 of the diffusion plate 12, and the diffusing surfaces 13. Thus, the diffusion plate 12 functions as the surface light source. Moreover, the total thickness of the conventional back light is the back light of a larger configuration than board thickness t' of a diffusion plate.
[0003]
[Problem(s) to be Solved by the Invention] however, the back light whose min is also threshold value and about [whose] a 1.5mm piece it is the total thickness of about 0.8mm with many present demands when an LED chip, a COB array, etc. are used for the total thickness as a back light in the conventional example constituted as mentioned above -- ** -- if carried out, there was a fault of not being suitable.
[0004] Moreover, the aperture width of light-emitting part reflective covering was constituted widely, and the conventional back light was that to which a clearance cannot but exist between the reflective end face of light-emitting part reflective covering, and the end face (outgoing radiation side 18) of the diffusion plate 12. For this reason, the leakage of light could not be prevented but there was a problem that futility arose in the amount of LED luminescence. Therefore, it is offering the back light with an optical high transmission efficiency which prevents the leakage of the light which the back light of this invention was made in view of the above-mentioned situation, the place made into the purpose made total thickness thinner, could be miniaturized, and emitted light.
[0005]
[Means for Solving the Problem] In order to solve an above-mentioned technical problem and to attain the purpose, the back light of this invention It is the back light which a base is made to carry out ON light of the light of the light source from the side-face edge of the optical diffusion plate member which comes to have a reflector, and acts as Idemitsu from the reflector of said optical diffusion plate member, and the field of the opposite side. It is characterized by making the board thickness of said optical diffusion plate member carry out abbreviation coincidence of the distance between the reflectors arranged in the vertical side of the space section formed between reflective covering holding said light source, and said side-face edge.
[0006] Moreover, preferably, said reflective covering is characterized by making at least one side fit into the crevice which was equipped with the wrap flange section and formed in the side-face edge of said optical diffusion plate member among the vertical sides of the luminescence reflective section which makes the light from said light source reflect in said optical diffusion plate member side, and said space section while it is formed in said board thickness and

abbreviation same thickness.
[0007]
[Function] As mentioned above, since the back light concerning this invention is constituted, by making equivalent aperture width of reflective covering, and thickness of the end face of a diffusion plate, total thickness is made thinner, it can miniaturize and the back light with an optical high transmission efficiency which prevents the leakage of the light which emitted light can be offered.
[0008]
[Example] With reference to an attached drawing, it explains about the example of this invention at a detail below. Drawing 1 is the external view of the back light of this example. Moreover, drawing 2 is a top view in the condition that drawing 1 assembled. Drawing 3 is the perspective view showing the configuration of a diffusion plate and a reflective sheet. Drawing 4 is the front view of the light-emitting part reflective covering 1 of drawing 1 . Drawing 5 is the top view of drawing 4 . Drawing 6 is the side elevation of the light-emitting part reflective covering 1. Hereafter, with reference to drawing 6 , the configuration of the back light of this example is explained from drawing 1 . A back light 100 carries out fitting of the light-emitting part reflective covering 1 and the diffusion plate 12, as shown in drawing 1 , and the appearance is constituted. In case it assembles, both are fixed by carrying out fitting of the height 15 for immobilization installed in the both-sides surface part 9 of the light-emitting part reflective covering 1, and the crevice 16 established in the diffusion plate 12. Moreover, the flange section 14 projected from the lateral portion 9 on both sides is formed in the upper part of the reflective covering 1, and the diffusion plate 12 is contacted so that the reflective covering 1 may not fall out caudad by this flange section 14. Moreover, a back light 100 is equipped with the reflective sheet 11 (refer to drawing 3), the light-emitting part reflective covering 1 which fixes the LED component 4, the leadframe 6 which mounts the LED component 4 and which is both electrically connected through lead wire 3, and the diffusion plate 12 which reflects LED light and is diffused (refer to drawing 4). Moreover, a back light 100 is a back light equipped with two LED components 4. The light-emitting part reflective covering 1 is constituted by luminescence side 1b which fixes reflective section end-face 1a, a lateral portion 9, and the LED component 4 and the leadframe tee 8, and the lens 2 which passes the light which emitted light from the LED component 4. A lens 2 is a concave lens to the LED component 4. The light-emitting part reflective covering 1 is manufactured by PBT in which the glass material was mixed. Moreover, the reflective covering 1 is constituted so that LED light can be reflected by reflective end-face 1a and luminescence side 1b. Moreover, the leadframe 6 intervenes between the light-emitting part reflective covering 1 and the reflective sheet 11, and the leadframe which fixes the LED component 4, and the leadframe which connects a light emitting device 4 electrically through lead wire 3 are soldered and (refer to drawing 7 and drawing 8) connected to the external substrate 5, respectively. Preferably, the leadframe 6 consists of flexible materials, and it is prepared so that it may mention later and may be bent. It is attached in the top face of the reflective sheet 11, and the diffusion plate 12 is formed in the part which counters opening of the light-emitting part reflective covering 1. As shown in drawing 3 , the diffusion plate 12 equips with the outgoing radiation side 17 the side-face edge 14 as for which LED light carries out ON light, and the top-face section, and the reflective sheet 11 is attached in the bottom surface part. Moreover, the diffusion plate 12 has a certain amount of thickness t, and it diffuses LED light effectively by forming a light guide line by Hazama of the outgoing radiation side 18 and the reflective sheet 11, and it is constituted so that it may act as reflective Idemitsu. It is formed so that it may become dense, as much heights keep away from the side near the LED component 4, and the so-called gradation pattern by heights is formed, and the diffusing surface 13 of the bottom surface part of the diffusion plate 12 is made as [perform / diffusion and reflection of LED light / efficiently]. Moreover, the reflective sheet 11 is an ingredient which has flexibility, and is formed in the diffusion plate 12 and this area. And as shown in drawing 1 , after the reflective covering 1 is fixed to the diffusion plate 12, adhesion immobilization of the reflective sheet 11 is carried out with Adhesives C at the rear face of the diffusion plate 12. In addition, one field S of the reflective sheet 11 forms the reflector which has a high reflection factor.
[0009] Moreover, as shown in drawing 9 mentioned later, the width of face X of opening (part of Hazama of reflective section end-face 1a and the reflective sheet 11) of the light-emitting part reflective covering 1 and thickness t of the diffusion plate 12 are set up so that it may become equivalent. In drawing 5 , between two LED components 4, while the installation section 10 installed from the reflective covering 1 is formed and reinforcing the reflective covering 1, after the LED light from two LED components 4 passes a lens 2, it is prepared so that it may reflect in the side-face edge 17 direction of a light guide plate 12 and may act as Idemitsu efficiently. The above is the whole back light

configuration of this example.
[0010] Next, with reference to drawing 6 , the erector of the back light of this example degree is explained from drawing 4 . The leadframe 6 shown in drawing 4 in drawing 6 from drawing 4 is equipped with the leadframe tee 8 which branches to four from the leadframe body (un-illustrating). The mounting section in which the LED component 4 is mounted with lead wire 3, and the extension further extended from the edge are prepared in the edge of the leadframe tee 8. Light-emitting part reflective covering is fabricated by the PCB resin by which the glass mentioned above was mixed so that this leadframe tee 8 may be included (insertion forming cycle).
[0011] Next, as the extension 6 of the leadframe tee 8 is shown in drawing 6 , it bends in the direction of View Y, and it bends so that it may be parallel to reflective end-face 1a and may project at the tooth back (part where the diffusion plate 12 is opposite) of the reflective covering 1 (terminal area folding process). In this condition, in four leadframe tees 8, bonding of the LED chip 4 is carried out to the edge of two tees, respectively, and bonding of the lead wire 3 is carried out to other two edges (bonding process).
[0012] Then, in order to protect the LED chip 4 and lead wire 3, a potting is carried out, and it is made to harden (potting process). Finally, after cutting off the unnecessary part of the leadframe tee 8, an examination of products is conducted and it becomes completion of the reflective covering 1 of this example (a leadframe clipping process and inspection process).
[0013] The back light of this example is manufactured through the above processes. Moreover, after the reflective covering 1 and the diffusion plate 12 are fixed, as are shown in drawing 7 , and it is shown in drawing 8 whether it is soldered on the mounting substrate 5, after inserting the leadframe 6 back projected at the terminal area folding process in the hole which was able to be made in the substrate, it is soldered, and is connected electrically.
[0014] Next, the optical actuation by the back light of this example is explained. Drawing 9 is the typical side elevation of the back light of this example. In drawing 9 , after going straight on as it is, and carrying out incidence to the diffusion plate 12 or reflecting by the reflective sheet 11 or reflective end-face 1a, respectively, incidence of the LED light R which emitted light from the LED component 4 is carried out to the diffusion plate 12. The field which the LED light R of the reflective sheet 11 reflects is a reflector which has a high reflection factor, as mentioned above. Here, the LED light R by which incidence was carried out to the diffusion plate 12 repeats reflection by Hazama with the inside of the outgoing radiation side 18 of the diffusion plate 12, the diffusion plate 13, or the reflective sheet 11, and the inside of the diffusion plate 12 is led to it in the LED component 4 and the direction of the opposite side. Outgoing radiation of the light which arrived at the outgoing radiation side 18 by the middle above the critical angle is carried out from the outgoing radiation side 18 outside. In the process, scattered reflection of the light which reached the scattered reflection section which consists of heights prepared in the diffusing surface 13 is carried out there to the outgoing radiation side 18 side. Therefore, without only the part near the LED component becoming bright since it is made so dense that it keeps away to the LED component 4 and the opposite side, these heights are formed so that LED light may become homogeneity at the outgoing radiation side 18 side.
[0015] (Effectiveness of an example) By processing the width of face X of opening of the reflective covering 1 on a par with the board thickness t of the diffusion plate 12, and assembling the reflective sheet 11 as a base as mentioned above, the clearance produced between the diffusion plate 12 and the light-emitting part reflective covering 1 is lost, and the leak by the exterior of the LED light R can be prevented.
[0016] Moreover, since leakage can be prevented, the variation in the brightness of the light by which outgoing radiation is carried out from the outgoing radiation side 18 can be prevented. Moreover, since the lower frame section of reflective covering is removed, it fixes to the reflective sheet 11 directly and width of face of opening and board thickness of a diffusion plate are made the same, the miniaturization of a back light is realizable.
[0017] Moreover, since it is manufactured by resin insert molding, the variation in the process tolerance at the time of mass-producing can be suppressed to min. In addition, this invention can apply the above-mentioned example to what corrected or deformed in the range which does not deviate from the meaning. For example, although the configuration of the back light of the liquid crystal display used for small devices, such as a handy terminal and a pager, was explained as an application of this example, there is nothing that is restricted to it, of course. Moreover, it cannot be overemphasized that the GURAJIESHON pattern which the surface roughening of the diffusing surface is not really limited to the gradation pattern of the projection by shaping, and prints the dot pattern of white ink, and the surface roughening by hairline processing may be used.
[0018]

[Effect of the Invention] Like explanation, by making equivalent aperture width of light-emitting part reflective covering, and thickness of the end face of a diffusion plate, total thickness is made thinner, and it can miniaturize and, according to the back light of this invention, is above effective in the ability to offer the back light with an optical high transmission efficiency which prevents the leakage of the light which emitted light.

[Translation done.]

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TECHNICAL FIELD

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PRIOR ART

[Description of the Prior Art] Many back lights conventionally used for irradiating the liquid crystal display section are proposed. For example, as shown in drawing 10 , back light 100' is equipped with the LED component 4, reflective covering 1', and the diffusion plate 12. The LED component 4 is fixed to a part of reflective covering 1' which reflects the LED light R while it fixes the LED component 4 on a substrate 5. Reflective covering 1' is fixed on a substrate 5. Moreover, the LED component 4 is electrically connected to the leadframe 6 through lead wire 3. As for the LED light source 4, the LED array of COB, an LED lamp, an LED chip lamp, etc. are used. Outgoing radiation of the LED light R emitted from the light source is carried out outside, reflecting between the reflective sheet 11 of the diffusion plate 12, and the diffusing surfaces 13. Thus, the diffusion plate 12 functions as the surface light source.

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EFFECT OF THE INVENTION

(Effectiveness of an example) By processing the width of face X of opening of the reflective covering 1 on a par with the board thickness t of the diffusion plate 12, and assembling the reflective sheet 11 as a base as mentioned above, the clearance produced between the diffusion plate 12 and the light-emitting part reflective covering 1 is lost, and the leak by the exterior of the LED light R can be prevented.
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[0017] Moreover, since it is manufactured by resin insert molding, the variation in the process tolerance at the time of mass-producing can be suppressed to min. In addition, this invention can apply the above-mentioned example to what corrected or deformed in the range which does not deviate from the meaning. For example, although the configuration of the back light of the liquid crystal display used for small devices, such as a handy terminal and a pager, was explained as an application of this example, there is nothing that is restricted to it, of course.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] however, the back light whose min is also threshold value and about [whose] a 1.5mm piece it is the total thickness of about 0.8mm with many present demands when an LED chip, a COB array, etc. are used for the total thickness as a back light in the conventional example constituted as mentioned above -- ** -- if carried out, there was a fault of not being suitable.
[0004] Moreover, the aperture width of light-emitting part reflective covering was constituted widely, and the conventional back light was that to which a clearance cannot but exist between the reflective end face of light-emitting part reflective covering, and the end face (outgoing radiation side 18) of the diffusion plate 12. For this reason, the leakage of light could not be prevented but there was a problem that futility arose in the amount of LED luminescence. Therefore, it is offering the back light with an optical high transmission efficiency which prevents the leakage of the light which the back light of this invention was made in view of the above-mentioned situation, the place made into the purpose made total thickness thinner, could be miniaturized, and emitted light.

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MEANS

[Means for Solving the Problem] In order to solve an above-mentioned technical problem and to attain the purpose, the back light of this invention It is the back light which a base is made to carry out ON light of the light of the light source from the side-face edge of the optical diffusion plate member which comes to have a reflector, and acts as Idemitsu from the reflector of said optical diffusion plate member, and the field of the opposite side. It is characterized by making the board thickness of said optical diffusion plate member carry out abbreviation coincidence of the distance between the reflectors arranged in the vertical side of the space section formed between reflective covering holding said light source, and said side-face edge.
[0006] Moreover, preferably, said reflective covering is characterized by making at least one side fit into the crevice which was equipped with the wrap flange section and formed in the side-face edge of said optical diffusion plate member among the vertical sides of the luminescence reflective section which makes the light from said light source reflect in said optical diffusion plate member side, and said space section while it is formed in said board thickness and abbreviation same thickness.

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OPERATION

[Function] As mentioned above, since the back light concerning this invention is constituted, by making equivalent aperture width of reflective covering, and thickness of the end face of a diffusion plate, total thickness is made thinner, it can miniaturize and the back light with an optical high transmission efficiency which prevents the leakage of the light which emitted light can be offered.

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EXAMPLE

[Example] With reference to an attached drawing, it explains about the example of this invention at a detail below. Drawing 1 is the external view of the back light of this example. Moreover, drawing 2 is a top view in the condition that drawing 1 assembled. Drawing 3 is the perspective view showing the configuration of a diffusion plate and a reflective sheet. Drawing 4 is the front view of the light-emitting part reflective covering 1 of drawing 1 . Drawing 5 is the top view of drawing 4 . Drawing 6 is the side elevation of the light-emitting part reflective covering 1. Hereafter, with reference to drawing 6 , the configuration of the back light of this example is explained from drawing 1 . A back light 100 carries out fitting of the light-emitting part reflective covering 1 and the diffusion plate 12, as shown in drawing 1 , and the appearance is constituted. In case it assembles, both are fixed by carrying out fitting of the height 15 for immobilization installed in the both-sides surface part 9 of the light-emitting part reflective covering 1, and the crevice 16 established in the diffusion plate 12. Moreover, the flange section 14 projected from the lateral portion 9 on both sides is formed in the upper part of the reflective covering 1, and the diffusion plate 12 is contacted so that the reflective covering 1 may not fall out caudad by this flange section 14. Moreover, a back light 100 is equipped with the reflective sheet 11 (refer to drawing 3), the light-emitting part reflective covering 1 which fixes the LED component 4, the leadframe 6 which mounts the LED component 4 and which is both electrically connected through lead wire 3, and the diffusion plate 12 which reflects LED light and is diffused (refer to drawing 4). Moreover, a back light 100 is a back light equipped with two LED components 4. The light-emitting part reflective covering 1 is constituted by luminescence side 1b which fixes reflective section end-face 1a, a lateral portion 9, and the LED component 4 and the leadframe tee 8, and the lens 2 which passes the light which emitted light from the LED component 4. A lens 2 is a concave lens to the LED component 4.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view showing the outline of the back light of this example.
[Drawing 2] It is the top view of the back light of this example.
[Drawing 3] It is the perspective view showing the configuration of a diffusion plate and a reflective sheet.
[Drawing 4] It is the front view of light-emitting part reflective covering.
[Drawing 5] It is the top view of drawing 4 .
[Drawing 6] It is the side elevation of drawing 5 .
[Drawing 7] It is drawing showing an example of the mounting gestalt when mounting the back light of this example in a substrate.
[Drawing 8] It is drawing showing an example of the mounting gestalt when mounting the back light of this example in a substrate.
[Drawing 9] It is the side elevation showing the outline of the back light of **********, and the principle of operation of light.
[Drawing 10] It is the side elevation showing the outline of the conventional back light, and the principle of operation of light.
[Description of Notations]
1 Light-emitting Part Reflective Covering
1a Reflective end face
1b Reflective side face
2 Lens
3 Lead Wire
4 LED Component
5 Mounting Substrate
6 Leadframe
8 Leadframe Tee
9 Reflective Covering Lateral Portion
10 Reflective Covering Installation Section
11 Reflective Sheet
12 Diffusion Plate
13 Diffusing Surface
t Diffusion plate thickness
R Light from the light source

[Translation done.]

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特開平7－235207

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Ｇ０２Ｂ	6/00	３３１			
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審査請求 未請求 請求項の数２ ＯＬ （全 ５ 頁）

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(22)出願日 平成６年(1994)２月21日

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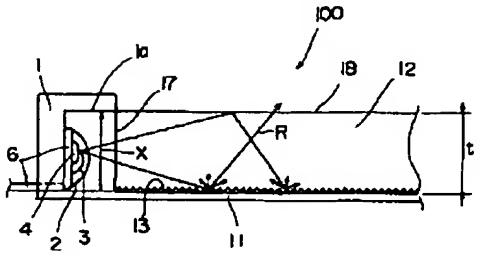
(54)【発明の名称】 バックライト

(57)【要約】
【目的】 総厚をより薄くして小型化でき、発光された光の漏れを防止する光伝達効率の高いバックライトを提供する。
【構成】 底面に反射面１１を有してなる光拡散板部材１２の側面縁部１７から光源を入光させて光拡散板部材１２の反射面と反対側の出射面１８から出光するバックライト１００であって、光源４を保持する反射カバーと側面縁部１７との間に形成される空間部の上下面に配設される反射面１ａと反射面１１との間の距離を光拡散板部材１２の板厚ｔに略一致させることを特徴とするバックライト。



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【特許請求の範囲】

【請求項1】 底面に反射面を有してなる光拡散板部材の側面縁部から光源の光を入光させ前記光拡散板部材の反射面と反対側の面から出光させるバックライトであって、

前記光源を保持する反射カバーと前記側面縁部との間に形成される空間部の上下面に配設される反射面間の距離を前記光拡散板部材の板厚に略一致させることを特徴とするバックライト。

【請求項2】 前記反射カバーは、前記板厚と略同厚に形成されると共に前記光源からの光を前記光拡散板部材側へと反射せしめる発光反射部と、

前記空間部の上下面のうち少なくとも一方を覆うつば部とを備え、

前記光拡散板部材の側面縁部に形成された凹部に嵌合せしめることを特徴とする請求項1に記載のバックライト。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、例えば、ＬＥＤ光源を有する液晶表示部のバックライトに関するものである。

【0002】

【従来の技術】従来より、液晶表示部を照射するのに用いられるバックライトは数多く提案されている。例えば、図１０に示すように、バックライト１００'は、ＬＥＤ素子４と、反射カバー１'と、拡散板１２とを備えるものである。ＬＥＤ素子４は、基板５上にＬＥＤ素子４を固定すると共に、ＬＥＤ光Ｒを反射する反射カバー１'の一部に固定される。反射カバー１'は、基板５上に固定される。また、ＬＥＤ素子４は、リード線３を介してリードフレーム６に電気的に接続されている。ＬＥＤ光源４は、ＣＯＢのＬＥＤアレー、ＬＥＤランプ、ＬＥＤチップランプ等が使用される。光源から放たれたＬＥＤ光Ｒは、拡散板１２の反射シート１１と拡散面１３との間を反射しながら外部に出射される。このようにして、拡散板１２は、面光源として機能するのである。また、従来のバックライトの総厚は、拡散板の板厚ｔ'よりも大きい構成のバックライトである。

【0003】

【発明が解決しようとする課題】しかしながら、上記のように構成される従来例においては、バックライトとしての総厚は、ＬＥＤチップやＣＯＢアレー等を使用すると最小でも1.5㎜幅程度が限界値であり、現在要求の多い総厚0.8㎜程度のバックライトをとしては適さないという欠点があった。

【0004】また、従来のバックライトは、発光部反射カバーの開口幅が広く構成されており、発光部反射カバーの反射端面と拡散板１２の端面（出射面１８）との間に隙間が存在せざるをえないものであった。このため、光の漏れを防止することができずＬＥＤ発光量に無駄が

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生じるという問題があった。従って、本発明のバックライトは、上記の事情に鑑みてなされたものであり、その目的とするところは、総厚をより薄くして小型化でき、発光された光の漏れを防止する光伝達効率の高いバックライトを提供することである。

【0005】

【課題を解決するための手段】上述の課題を解決し、目的を達成するために、本発明のバックライトは、底面に反射面を有してなる光拡散板部材の側面縁部から光源の光を入光させ前記光拡散板部材の反射面と反対側の面から出光させるバックライトであって、前記光源を保持する反射カバーと前記側面縁部との間に形成される空間部の上下面に配設される反射面間の距離を前記光拡散板部材の板厚に略一致させることを特徴としている。

【0006】また、好ましくは、前記反射カバーは、前記板厚と略同厚に形成されると共に前記光源からの光を前記光拡散板部材側へと反射せしめる発光反射部と、前記空間部の上下面のうち少なくとも一方を覆うつば部とを備え、前記光拡散板部材の側面縁部に形成された凹部に嵌合せしめることを特徴としている。

【0007】

【作用】以上のように、この発明に係わるバックライトは構成されているので、反射カバーの開口幅と拡散板の端面の厚さとを同等にすることにより、総厚をより薄くして小型化でき、発光された光の漏れを防止する光伝達効率の高いバックライトを提供できる。

【0008】

【実施例】以下に本発明の実施例につき、添付の図面を参照して詳細に説明する。 図１は、本実施例のバックライトの外観図である。また、図２は、図１の組み立てた状態の平面図。図３は、拡散板と反射シートとの構成を示す斜視図。図４は、図１の発光部反射カバー１の正面図。図５は、図４の平面図。図６は、発光部反射カバー１の側面図である。以下、図１から図６を参照して、本実施例のバックライトの構成を説明する。バックライト１００は、図１に示すように、発光部反射カバー１と拡散板１２を嵌合させてその外形が構成される。組み立てる際には、発光部反射カバー１の両側面部９に延設された固定用突起部１５と、拡散板１２に設けられた凹部１６とを嵌合させることによって両者を固定する。また、反射カバー１の上部には、両側に側面部９から突出したつば部１４が形成され、このつば部１４によって、反射カバー１が下方に抜け落ちることのないように、拡散板１２に当接する。また、バックライト１００は、反射シート１１（図３参照）と、ＬＥＤ素子４を固定する発光部反射カバー１と、ＬＥＤ素子４を実装する共に、リード線３を介して、電気的に接続するリードフレーム６と、ＬＥＤ光を反射し、拡散する拡散板１２とを備える（図４参照）。また、バックライト１００は、ＬＥＤ素子４を２つ備えたバックライトである。発光部反射カ

バー1は、反射部端面1aと、側面部9と、LED素子4及びリードフレーム分岐部8を固定する発光面1bと、LED素子4から発光された光を通過させるレンズ2とにより構成されている。レンズ2は、LED素子4に対して凹状なレンズである。発光部反射カバー1は、ガラス素材が混入されたPBTで製造されている。また、反射カバー1は、LED光を反射端面1aと発光面1bで反射できるように構成されている。また、発光部反射カバー1と反射シート11との間には、リードフレーム6が介在しており、LED素子4を固定するリードフレームと、リード線3を介して発光素子4を電気的に接続するリードフレームが夫々外部の基板5に対してハンダ付けされて（図7、図8参照）、接続されている。リードフレーム6は、好ましくは、フレキシブルな素材で構成されており、後述するように折曲げられるように設けられている。反射シート11の上面に取付けられていて、発光部反射カバー1の開口部に対向する部位には拡散板12が設けられている。図3に示すように、拡散板12は、LED光が入光する側面縁部14と、上面部に出射面17を備え、底面部に反射シート11が取り付けられている。また、拡散板12は、ある程度の厚さtを有し、出射面18と反射シート11との間で導光路を形成することでLED光を有効に拡散させ、反射出光させるように構成されている。拡散板12の底面部の拡散面13は、多数の凸部がLED素子4に近い側から遠ざかるに従って密になるように形成されており、凸部による所謂グラディエーションパターンが形成され、LED光の拡散及び反射を効率的に行なうようになされている。また、反射シート11は、可撓性を有する材料であり、拡散板12と同面積に形成されている。そして、反射シート11は、図1に示すように、反射カバー1が拡散板12に固定された後に、拡散板12の裏面に接着剤Cで接着固定される。尚、反射シート11の一方の面Sが、高反射率を有する反射面を形成している。

【0009】また、後述する図9に示すように、発光部反射カバー1の開口部（反射部端面1aと反射シート11との間の部分）の幅Xと拡散板12の厚さtとは同等になるように設定されている。図5において、2つのLED素子4との間には、反射カバー1から延設された延設部10が設けられ、反射カバー1を補強すると共に、2つのLED素子4からのLED光がレンズ2を通過した後に導光板12の側面端部17方向に反射して効率よく出光するように設けられている。以上が本実施例のバックライトの全体構成である。

【0010】次に、図4から図6を参照して、本実施例のバックライトの組立工程について説明する。図4から図6において、図4に示すリードフレーム6は、リードフレーム本体（不図示）から4本に分岐するリードフレーム分岐部8を備えている。リードフレーム分岐部8の端部には、LED素子4がリード線3と共に実装される

実装部と、端部から更に延長された延長部とが設けられている。このリードフレーム分岐部8を含めるように、前述したガラスが混入されたPCB樹脂で発光部反射カバーを成形する（インサート成形工程）。

【0011】次に、リードフレーム分岐部8の延長部6を、図6に示す如く、矢視Yの方向に折曲げ、反射端面1aに平行で反射カバー1の背面（拡散板12とは反対の部位）に突出するように折曲げる（端子部折曲げ工程）。この状態で、4本のリードフレーム分岐部8のなかで、2本の分岐部の端部にLEDチップ4を夫々ボンディングし、他の2本の端部にリード線3をボンディングする（ボンディング工程）。

【0012】その後、LEDチップ4とリード線3とを保護するためにポッテングして、硬化させる（ポッティング工程）。最後に、リードフレーム分岐部8の不要な部分を切り落とした後、製品検査を行なって本実施例の反射カバー1の完成となる（リードフレーム切り落とし工程及び検査工程）。

【0013】以上のような工程を経て、本実施例のバックライトは製造される。また、反射カバー1と拡散板12とが固定された後、端子部折曲げ工程で後方に突出したリードフレーム6は、図7に示すように、実装基板5上にハンダ付けされるか、図8に示すように基板に開けられた穴に挿入してからハンダ付けされ、電気的に接続される。

【0014】次に、本実施例のバックライトによる光学的な動作について説明する。図9は、本実施例のバックライトの模式的側面図である。図9において、LED素子4から発光されたLED光Rは、そのまま直進して拡散板12に入射するか、反射シート11又は反射端面1aで夫々反射した後、拡散板12に入射される。反射シート11のLED光Rが反射する面は、前述したように、高反射率を有する反射面である。ここで、拡散板12に入射されたLED光Rは、拡散板12の出射面18の内面と拡散板13又は反射シート11との間で反射を繰り返して拡散板12内をLED素子4と反対側の方向へと導かれる。その途中で、出射面18に臨界角以上で到達した光は、出射面18から外部へと出射される。その過程において、拡散面13に設けられた凸部からなる乱反射部に到達した光は、そこで出射面18側へと乱反射される。従って、この凸部は、LED素子4と反対側に遠ざかるほど密にされているので、LED素子の近くの部分だけ明るくなることなく、出射面18側までLED光が均一になるように形成されている。

【0015】（実施例の効果）以上のように、反射カバー1の開口部の幅Xを、拡散板12の板厚tと同等に加工し、反射シート11を基部として組み立てることによって、拡散板12と発光部反射カバー1との間に生じる隙間を無くし、LED光Rの外部へのもれを防止できるのである。

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【0016】また、漏れを防止できることから、出射面18から出射される光の輝度のバラツキを防止できるのである。また、反射カバーの下部フレーム部を取り去り、反射シート11に直接固定して、開口部の幅と拡散板の板厚とを同じにすることから、バックライトの小型化が実現できるのである。

【0017】また、樹脂インサート成形によって製造されるので、量産する際の加工精度のバラツキを最小に抑えることができる。尚、本発明は、その趣旨を逸脱しない範囲で上記実施例を修正又は変形したものに適用可能である。例えば、本実施例の用途として、ハンディターミナルやページャ等の小型機器に用いられる液晶ディスプレイのバックライトの構成を説明したが、もちろんそれに限られるものはない。また、拡散面の粗面化は、一体成形による突起のグラディエーションパターンに限定されるものでなく、白インキのドットパターンを印刷するグラジェーションパターンや、ヘアライン加工による粗面化でも良いことは言うまでもない。

【0018】

【発明の効果】以上説明のように、本発明のバックライトによれば、発光部反射カバーの開口幅と拡散板の端面の厚さとを同等にすることにより、総厚をより薄くして小型化でき、発光された光の漏れを防止する光伝達効率の高いバックライトを提供できる効果がある。

【図面の簡単な説明】

【図1】本実施例のバックライトの概略を示す斜視図である。

【図2】本実施例のバックライトの平面図である。

【図3】拡散板と反射シートとの構成を示す斜視図である。

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【図4】発光部反射カバーの正面図である。

【図5】図4の平面図である。

【図6】図5の側面図である。

【図7】本実施例のバックライトを基板に実装するときの実装形態の一例を示す図である。

【図8】本実施例のバックライトを基板に実装するときの実装形態の一例を示す図である。

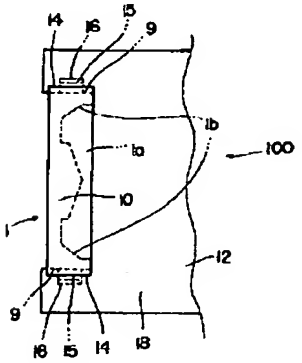
【図9】本実施例ののバックライトの概略と光の動作原理を示す側面図である。

【図10】従来のバックライトの概略と光の動作原理を示す側面図である。

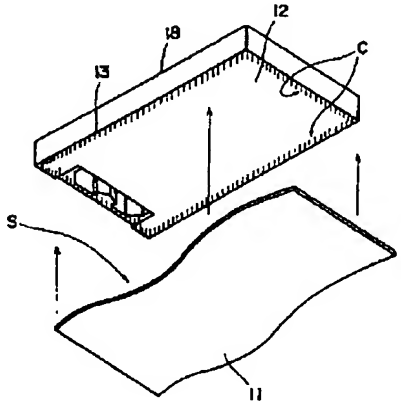
【符号の説明】

1	発光部反射カバー
1a	反射端面
1b	反射側面
2	レンズ
3	リード線
4	LED素子
5	実装基板
6	リードフレーム
8	リードフレーム分岐部
9	反射カバー側面部
10	反射カバー延設部
11	反射シート
12	拡散板
13	拡散面
t	拡散板厚さ
R	光源からの光

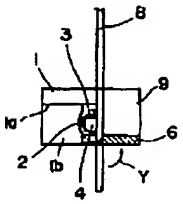
【図2】



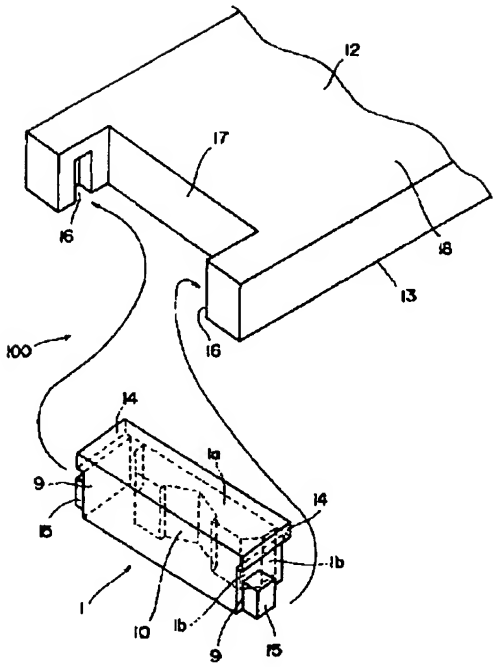
【図3】



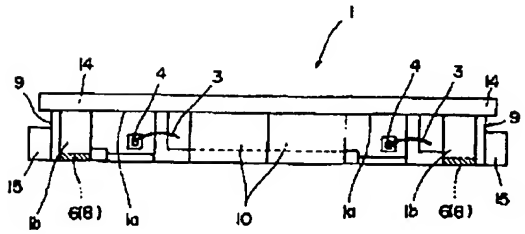
【図6】



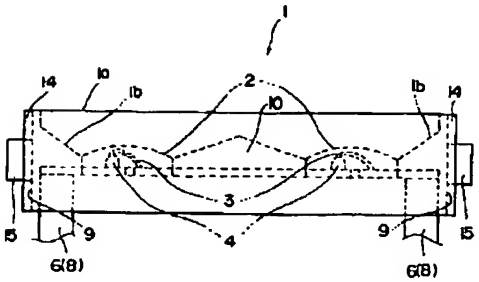
【図1】



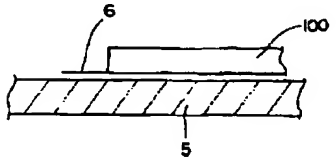
【図4】



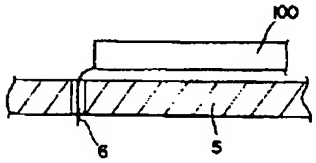
【図5】



【図7】



【図8】



【図9】

【図10】